

# Nomenclatural notes on *Cyclachaena* (Compositae: Heliantheae), resurrection and lectotypification of *Iva* sect. *Picrotus*, and report of *Iva* (syn. *Cyclachaena*) as new to Armenia

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## Abstract

The native New World genus *Iva* is reported as new to Armenia based on a recent collection of *Iva xanthiifolia* (marsh-elder). *Cyclachaena* is treated as a synonym of the newly resurrected *Iva* sect. *Picrotus*, which is treated as containing a single species. *Iva* sect. *Picrotus* is lectotypified by *Iva paniculata*. *Iva xanthiifolia* and *Cyclachaena xanthiifolia* are treated as taxonomic synonyms, and not nomenclatural synonyms. Therefore, *Cyclachaena* is typified by *Cyclachaena xanthiifolia*. *Iva*, *Ambrosia*, and *Xanthium* as traditionally defined may not be monophyletic, but in lieu of published combined nuclear and chloroplast DNA analyses of the genera of Ambrosiinae, are recognized in the traditional sense, rather than lumped or split.

## Introduction

A collection under the name *Ambrosia* L. (Heliantheae: Ambrosiinae) made recently in Armenia and not matched by ELEONORA GABRIELIAN (of the Institute of Botany, ERE, in Yerevan, Armenia) was given to me for identification. While this collection is similar in gross appearance to *Ambrosia* (which has unisexual capitula and cypselae of the pistillate florets wholly enveloped by the subtending phyllaries), the plant in front of me differs by having bisexual capitula with cypselae free from the phyllaries.

This collection from Armenia is identified here as *Iva xanthiifolia* NUTT. *Iva xanthiifolia* is native to the Americas, but JACKSON (1960) and TUTIN et al. (1976) each note that it is widely naturalized in Europe. This same species [sub *Cyclachaena xanthiifolia* "(NUTT.) FRESEN." ] was noted by SMOLJANINOVA (1959) as naturalized in the former Soviet Union in the Ukraine and adjacent areas. SMOLJANINOVA (1959) did not cite this species in the region south of the Caucasus Mountains. Neither *Iva* L. nor *Cyclachaena* FRESEN. were listed in the treatments of Compositae in the floras of Armenia (TAKHTAJAN 1995) and Turkey (DAVIS 1975). Thus, the documentation herein

of *Iva xanthiifolia* from the Shirak region represents a new generic record for the flora of Armenia.

### Nomenclatural history of marsh-elder

The marsh-elder (*Iva xanthiifolia* NUTT.) was described in 1818 and includes *Cyclachaena xanthiifolia* FRESEN. as a taxonomic synonym. *Cyclachaena*, described in 1836, has been variously treated nomenclaturally since its inception. The protologue was not seen by the compilers of *Index Nominum Genericorum* (FARR et al. 1979), who listed the genus as “*Cyclachaena* FRESENIUS ex SCHLECHTENDAL, *Linnaea* 12 (Litt.): 78. 1838” and the type “non designatus.” The protologue of *Cyclachaena* shows that the author of the genus is FRESENIUS, that *Cyclachaena xanthiifolia* is the generitype, and that *Cyclachaena xanthiifolia* FRESEN. was not based on *Iva xanthiifolia* NUTT.

The first infrageneric use of *Cyclachaena* was as *Iva* subgen. *Cyclachaena* (FRESEN.) A. GRAY, into which was placed *Iva xanthiifolia*. This subgeneric combination was mistakenly attributed by JACKSON (1960) as a sectional combination, whereas BRIZICKY (1969) and K. GANDHI (pers. comm.) noted that in the preface to GRAY’S *Synoptical Flora* the substantive infrageneric names are said to be treated as subgenera. HOFFMANN (1890–1894) appears to have been the first to treat *Cyclachaena* at the sectional rank within *Iva*.

*Iva* sect. *Picrotus* was circumscribed by NUTTALL (1840–1841) as containing two species (*I. xanthiifolia* and *I. paniculata* NUTT.), neither species name being designated by NUTTALL as the type. Because the NUTTALL holotype of *I. xanthiifolia* was not located, I must choose *Iva paniculata* as the lectotype of *Iva* sect. *Picrotus*. GRAY (1884) treated both NUTTALL species names as taxonomic synonyms of *I. xanthiifolia*, and one of the three subgenera recognized by GRAY (1884) was the newly combined *Iva* subgen. *Cyclachaena* (FRESEN.) A. GRAY. As treated by GRAY (1884), *Iva* subgen. *Cyclachaena* contained both NUTTALL species, *Cyclachaena xanthiifolia*, as well as *Iva* sect. *Picrotus*. At the sectional rank, however, *Iva* sect. *Picrotus* has priority over *Iva* sect. *Cyclachaena*.

Although *Cyclachaena xanthiifolia* and *Iva xanthiifolia* have commonly been treated as homotypic (e.g., JACKSON 1960, CRONQUIST 1994, SMOLJANINOVA 1959, STROTHER 2000), FRESENIUS (1836) neither directly nor indirectly referred to *Iva xanthiifolia* or to THOMAS NUTTALL. While CRONQUIST (1994) noted that *Cyclachaena xanthiifolia* and *Iva xanthiifolia* might not be homotypic, he ultimately treated them as homotypic. The protologue of each species cited localities along the Missouri River, the *Iva* being described from material collected near “Fort Mandan,” whereas FRESENIUS cited a MAXIMILIAN collection from “Fort Union.” The original site of Fort

Mandan, which may now be underwater in the middle of the present Mississippi riverbed (ROBERTS 1988), is near Stanton, North Dakota, about 60 km NNW of the City of Mandan, North Dakota. Fort Union is some 210 km upriver from Stanton, near the border between the states of North Dakota and Montana.

The species names of NUTTALL and FRESenius are independent nomenclatural entities and are from moderately distant localities. There is no direct or indirect nomenclatural link between these two names, albeit taxonomically synonymous as treated by GRAY (1884), JACKSON (1960), and CRONQUIST (1994). Consequently, the generic name *Cyclachaena* is typified by *C. xanthiifolia* FRESen., not by *Iva xanthiifolia* NUTT. The correct name for the marsh-elder in the genus *Iva* is *I. xanthiifolia* NUTT. 1818, whereas if treated as the genus *Cyclachaena* the correct name of the plant is *C. xanthiifolia* FRESen. 1836, the nomenclatural transfer of NUTTALL's epithet being blocked in *Cyclachaena* by the later heterotypic FRESenius binomial.

### Taxonomic treatment

*Iva* (Heliantheae: Ambrosiinae) was revised by JACKSON (1960) who recognized three sections (including sect. *Cyclachaena*) and 15 mostly temperate North American species. Here I treat *Iva* in the broad sense, albeit containing only 14 species as I do not herein formally return *Hedosyne ambrosiifolia* (A. GRAY) STROTHER (2000) to *Iva* s.l. The genus is known also in tropical Mexico and the West Indies, but not in South America (JACKSON 1960). GRAY (1884), HOFFMANN (1890-1894), BRITTON & BROWN (1913), JACKSON (1960), CORRELL & JOHNSTON (1970), TUTIN et al. (1976), CRONQUIST (1980), GLEASON & CRONQUIST (1991), and CRONQUIST (1994) are among the standard references that treated *Iva* as including the synonymous *Cyclachaena* (albeit sometimes indirectly sub the name *Iva xanthiifolia*), whereas TORREY & GRAY (1841-1843), BENTHAM & HOOKER (1873), RYDBERG (1922), BOLICK (1985), SMOLJANNOVA (1959), and STROTHER (2000) recognized unispecific *Cyclachaena* as distinct from *Iva*.

*Iva* sect. *Cyclachaena* sensu JACKSON (1960) differs from *Iva* sect. *Iva* and sect. *Linearibracteata* R. JACKSON by having dissected (vs. entire) leaves, by ebracteate (vs. bracteate) capitulescences, by non-connate phyllaries in two series, and by minute (vs. small) corollas of the pistillate florets. These differences are taken here as sectional differences, and not as important at the generic rank. While the features (e.g., bisexual or unisexual capitula) used to distinguish *Iva* from traditionally related genera of Ambrosiinae (e.g. *Ambrosia* and *Xanthium*) may not be phylogenetically significant, the morphological features used to separate *Cyclachaena* from *Iva* are admittedly slight.

KARIS (1993) in his Heliantheae overview noted that *Iva dealbata* of *Iva* sect. *Cyclachaena* (sensu JACKSON 1960) "corresponds well to other examined *Iva* species"

and BREMER (1994) treated *Iva* in the sense of JACKSON. However, the cladogram of KARIS (1995: pp. 50–51) shows that as currently circumscribed *Ambrosia*, *Iva* and *Xanthium* may not be monophyletic. The cladogram in KARIS (1995) shows *Hymenoclea* and *Xanthium* are nested within a traditionally circumscribed *Ambrosia*, and that this subclade in turn is nested within the *Iva-Euphrosyne-Ambrosia-Xanthium-Hymenoclea* clade. KARIS (1995) recommended recognition of *Cyclachaena* at the generic rank, yet maintained a paraphyletic *Ambrosia* pending further investigation. MIAO et al. (1995a) showed that by chloroplast DNA features *Iva* sect. *Cyclachaena* (sensu JACKSON, 1960) may be polyphyletic and MIAO et al. (1995b) showed that the genus *Parthenium* appears sister to the remaining taxa of Ambrosiinae. In the Ambrosiinae subclade sister to *Parthenium*, STROTHER & BALDWIN (2002) reduced *Hymenoclea* to *Ambrosia*, but retained *Iva* and *Xanthium*.

Cladistically (see cladogram in KARIS 1995: pp. 50–51), cases could be made for either (1) a single broadly defined genus including *Ambrosia*, *Cyclachaena*, *Iva*, *Xanthium* etc. or (2) recognizing many genera within the *Iva-Euphrosyne-Ambrosia-Xanthium-Hymenoclea* clade. Similarly, the cladogram in MIAO et al. (1995b) supports cases for either (1) treating *Iva*, *Ambrosia*, *Xanthium*, etc. as congeneric and sister to *Parthenium* or (2) splintering traditionally defined *Iva*, *Ambrosia*, *Xanthium*, etc. into microgenera. Moreover, it is conceivable that nuclear DNA analysis of subtribe Ambrosiinae (not known to me to have been published) would group taxa differently than KARIS (1995) and MIAO et al. (1995b).

In lieu of published combined nuclear and chloroplast DNA analysis of the genera of Ambrosiinae, however, I defer modification (be it lumping or splitting) of the traditionally accepted circumscriptions of *Ambrosia*, *Iva*, *Xanthium*, etc. Nevertheless, I recognize solely *Iva xanthiifolia* within *Iva* sect. *Picrotus* (syn. *Iva* sect. *Cyclachaena*), yet it is not my aim here to make sectional combinations in *Iva* for the four additional species of *Iva* sect. *Cyclachaena* (sensu JACKSON) excluded herein from *Iva* sect. *Picrotus*, nor to formally reduce *Hedosyne* STROTHER to synonymy under *Iva* s.l.

Here, I simply provide treatments of *Iva*, *Iva* sect. *Picrotus*, and *I. xanthiifolia*, which may be inserted in the Flora of Armenia (TAKHTAJAN 1995) between the treatments by AVETISJAN (1995) of *Ambrosia* (genus 70) and *Xanthium* L. (genus 71), and numbered as genus 70.1. The voucher documenting this species in Armenia is also listed.

***IVA* L., Sp. Pl. 988, 1753. Lectotype (chosen by BRITTON & BROWN 1913: 338): *Iva annua* L.**

*Denira* ADANS., Fam. Pl. 2: 118, 549. 1763. Type: *Iva frutescens* L.

*Cyclachaena* FRESEN., Index Sem. (Frankfurt) 4, 1836. *Iva* subgen. *Cyclachaena* (FRESEN.) A. GRAY, Syn. Fl. N. Amer. 1(2): 245. 1884 (as “§”). *Iva* sect. *Cyclachaena*



(FRESEN.) O. HOFFM. in ENGL. & PRANTL, Nat. Pflanzenfam. 4(5): 221. 1890. Type: *Cyclachaena xanthiifolia* FRESEN. [= *Iva xanthiifolia* NUTT.]

*Oxytenia* NUTT., Proc. Acad. Nat. Sci. Philadelphia 4: 20. 1848. Type: *Oxytenia acerosa* NUTT. [= *Iva acerosa* (NUTT.) R. C. JACKS.]

*Iva* subgen. *Chorisiva* A. GRAY, Syn. Fl. N. Amer. 1(2): 247. 1884 (as “§”). *Iva* sect. *Chorisiva* (A. GRAY) O. HOFFM. in ENGL. & PRANTL, Nat. Pflanzenfam. 4(5): 221. 1890. *Chorisiva* (A. GRAY) RYDB., N. Amer. Fl. 33: 8. 1922. Type: *Iva nevadensis* M. E. JONES.

*Leuciva* RYDB., N. Amer. Fl. 33: 8. 1922. Type: *Iva dealbata* A. GRAY.

Erect annual herbs to shrubs, glabrous or pubescent. *Leaves* opposite or sometimes alternate distally, entire to pinnately dissected; sessile to long-petiolate. *Capitulescence* many headed, bracteate or ebracteate. *Capitula* heterogamous, disciform or obscurely radiate, 4–30-flowered, often nodding, sessile or subsessile; involucre turbinate to hemispherical; phyllaries 3–9, imbricate, subequal, uniseriate or biseriate, mostly herbaceous, sometimes connate proximally when uniseriate, often pubescent; receptacle very reduced, obscurely paleate. *Marginal unisexual florets* pistillate, 1–9; corolla short, tubular, or sometimes nearly obsolete and represented merely by a small bit of tissue on top of the cypselae. *Disk florets* functionally staminate, 3–21, corolla tubular, shortly 5-lobed, often glandular; filaments shorter than thecae, thecae merely connivent to weakly connate; style undivided, ovary vestigial or lacking. *Cypselae* marginal, slightly obcompressed, thickened, obovoid, tapered basally, rounded apically, black, glabrous, glandular, or pubescent, surface muricate or smooth, margins not corky, cypselae shed singly, not with adjacent paleae; pappus none.

*Iva* sect. *Picrotus* NUTT., Trans. Amer. Philos. Soc., n.s. 7: 346. 1840 (as “§”). Lectotype (designated here): *Iva paniculata* NUTT.

*Cyclachaena* FRESEN., Index Sem. (Frankfurt) 4, 1836. *Iva* subgen. *Cyclachaena* (FRESEN.) A. GRAY, Syn. Fl. N. Amer. 1(2): 245. 1884 (as “§”). *Iva* sect. *Cyclachaena* (FRESEN.) O. HOFFM. in ENGL. & PRANTL, Nat. Pflanzenfam. 4(5): 221. 1890. Type: *Cyclachaena xanthiifolia* FRESEN. [= *Iva xanthiifolia* NUTT.]

*Oxytenia* NUTT., Proc. Acad. Nat. Sci. Philadelphia 4: 20. 1848. Type: *Oxytenia acerosa* NUTT. [= *Iva acerosa* (NUTT.) R. C. JACKS.].

*Iva* subgen. *Chorisiva* A. GRAY, Syn. Fl. N. Amer. 1(2): 247. 1884 (as “§”). *Iva* sect. *Chorisiva* (A. GRAY) O. HOFFM. in ENGL. & PRANTL, Nat. Pflanzenfam. 4(5): 221. 1890. Type: *Iva nevadensis* M. E. JONES.

*Leuciva* RYDB., N. Amer. Fl. 33: 8. 1922. Type: *Iva dealbata* A. GRAY.

*Iva* sect. *Picrotus* was described (NUTTALL 1840–1841) based on *Iva xanthiifolia* and

*Iva paniculata*. ASA GRAY (1884) placed *Iva* sect. *Picrotus* in synonymy of *Iva* subgen. *Cyclachaena*. HOFFMANN (1890–1894) reduced GRAY's subgenus to the sectional rank as *Iva* sect. *Cyclachaena*. More recently, JACKSON (1960) misattributed GRAY's subgenus as a section, treated *Iva xanthiifolia* as including both original elements of *Iva* sect. *Picrotus*, as well as the generitype of *Cyclachaena*, but did not cite *Iva* sect. *Picrotus*. I designate *Iva paniculata* as the lectotype of *Iva* sect. *Picrotus*. This lectotypification, coupled with JACKSON's species synonymy, renders *Iva* sect. *Cyclachaena* as synonymous with the earlier *Iva* sect. *Picrotus*.

The sole species included here in *Iva* sect. *Picrotus* is *Iva xanthiifolia* NUTT. JACKSON (1960) placed the following five species within *Iva* sect. *Cyclachaena*: *Iva acerosa* (NUTT.) R. C. JACKS., *Iva ambrosiifolia* (A. GRAY) A. GRAY, *Iva dealbata* A. GRAY, *Iva nevadensis* M. E. JONES, and *Iva xanthiifolia* NUTT. As noted above, however, *Iva* sect. *Cyclachaena* (sensu JACKSON) is not monophyletic (cf. BOLICK 1985, KARIS 1995, MIAO et al. 1995a, 1995b, STROTHER 2000), but monophyly is achieved here by treating the section as containing but a single species.

*Iva xanthiifolia* NUTT., Gen. N. Amer. Pl. 2: 185. 1818, as “*xanthiifolia*.” Type: United States: North Dakota: On the banks of the Missouri River, near Fort Mandan, s.d., NUTTALL s.n. (holotype: BM? or PH?). CHARLIE JARVIS (pers. comm.) was unable to locate a NUTTALL collection labelled with the basionym in the British Museum. Similarly, a NUTTALL collection of this name was not found in PH (JAMES MACKLIN, pers. comm.). Nevertheless, it seems likely that the NUTTALL collection is in either BM or PH, albeit not located.

*Cyclachaena xanthiifolia* FRESEN., Index Sem. (Frankfurt) 1, 4. 1836, as “*xanthiifolia*.” *Euphrosyne xanthiifolia* (FRESEN.) A. GRAY, Pl. Wright. 2: 85. 1853 [Smithsonian Contr. Knowl. 5(6): 85. 1853], as “*xanthiifolia*.” Type: United States: North Dakota or Montana: In sylvis prope Fort Union allisque locis Missouri superioris, 1832–1834, MAXIMILIAN s.n. (holotype: FR?). The original set of MAXIMILIAN's North American collections is at W, whereas FRESENIUS worked at FR. BRUNO WALLNÖFER (pers. comm.) was unable to find a MAXIMILIAN collection with this basionym in Vienna; thus the herbarium in Frankfurt may hold the holotype material. Fort Union is in North Dakota, only a few km east of Montana. It is located on the Missouri River just upstream from the confluence with Yellowstone River. The type locality, however, cannot be attributed with certainty to either state. *Cyclachaena* was described on the fourth (all unnumbered) page of this seed catalogue, but the binomial of the generitype appears only on the first page. Both pages must be consulted for validation of this species name.

*Iva paniculata* NUTT., Trans. Amer. Philos. Soc., n. s. 7: 347. 1840. Type: United States: Rocky Mountains, by streams, in alluvial places, s.d., NUTTALL s.n. (holotype: BM n.v., digital image!). ROBIN KENNEDY (pers. comm.), during a trip to London in 2001, found a

NUTTALL collection labelled with the basionym in the British Museum. Similarly, this year CHARLIE JARVIS (pers. comm.) located this same NUTTALL collection in the British Museum. A NUTTALL collection of this name was not found in PH (JAMES MACKLIN, pers. comm.), thus I consider the NUTTALL collection in BM to be the holotype. The NUTTALL collection in BM is marked with an asterisk (see fig. 1) typical of NUTTALL novelties, thus there is no doubt of the authenticity of this specimen.

*Cyclachaena pedicellata* RYDB., Fl. N. Amer. Fl. 33: 10. 1922. *Iva pedicellata* (RYDB.) CORY, Rhodora 38: 407. 1936. *Iva xanthiifolia* var. *pedicellata* (RYDB.) KITTELL, Fl. Ariz. N. Mex. 425. 1941. Type: United States. New Mexico: Santa Fé, 14 Sep 1895, MULFORD 1284 (holotype: NY!).

Annual tap-rooted herbs, 0.25–1.5 (2.4) m tall. *Stem* mostly simple, subterete, striate, glabrous, sometimes distally pilose or branching. *Leaves* opposite or distally alternate, long-petiolate; petiole (1) 2–9 (25) cm long, thin; blade simple or less commonly leaves of proximal nodes with blades trilobed, generally ovate to broadly so, distal leaves often narrowly elliptic, lanceolate, or oblanceolate, (2.5) 4–12 (21) cm long, (0.7) 1.5–11 (23) cm wide, chartaceous, trinerved from base or nearly so, reticulate, the adaxial surface scabridulous, sometimes lightly glandular, green, the abaxial surface hirsute, glandular, light green, base acute to truncate, apex acute to attenuate, margins irregularly serrate. *Capitulescence* terminal and axillary, thyrsoid-paniculate, many-headed, ebracteate, to 30 cm or more tall, ultimate branches ascending or less commonly spreading, mostly less than 15 cm long, these spicate with several to many essentially sessile capitula. *Capitula* 13–17 (25)-flowered, ca. 3 mm tall; involucre hemispherical 1.5–3 mm tall, 3–4.5 mm wide; phyllaries persistent, ca. 10, biseriate, broadly ovate, abaxially pubescent, the outer phyllaries herbaceous, opposite the inner series, the inner phyllaries scarious, oblong, cucullate, as broad as, subtending, and closely appressed to weakly enfolding the outer surface of the associated cypselae; receptacle weakly paleate, pales linear, ca. 0.3 mm long, glabrous or glandular. *Marginal florets* ca. 5; corolla tubular, nearly obsolete, ca. 0.1 mm long; style to 0.4–0.6 mm long, branches 0.2–0.3 mm long, spreading. *Disk florets* 8–13 (20), ca. 1.5 mm long; corolla funnellform, yellowish or cream-coloured, glandular; ovary vestigial, linear. *Cypselae* 2–2.5 mm long, commonly lightly hispidulous or glandular; chromosome number  $2n = 36$  (CRONQUIST 1994, MIZIANTY et al. 1983).

Specimen examined: Armenia. Shirak Region, near Arax River, vil. Jrapy, 1450 m, 30 June 2003, H. STEPHANJAN s.n. (ERE n.v., MO!).

**Distribution and Ecology:** This summer- to fall-flowering annual herb is generally found in moist areas in a variety of disturbed habitats in north temperate zones. *Iva xanthiifolia* is apparently native to western North America (CORRELL & JOHNSTON 1970, CRONQUIST 1994, JACKSON 1960), but does not occur southwards near the Mexican border, nor does it occur in California (HICKMAN 1993). It is introduced to

eastern North America, where it may be found in the northern United States and adjacent Canada (BRITTON & BROWN 1913, GLEASON & CRONQUIST 1991, JACKSON 1960). It is found in the more temperate zones of the southern United States (CRONQUIST 1980), but not in the Gulf Coast subtropical zone.

*Iva xanthiifolia* is listed as a noxious weed by the Federal Government of the United States, causes contact dermatitis (pers. obs., JACKSON 1960), and its pollen is a known agent of hay fever (JACKSON 1960). That this species causes hay fever may be inferred from its common name of “false ragweed,” although its most frequent common name (marsh-elder) and some of its other common names (e.g., burweed, horseweed, sumpweed) perhaps do not indicate this.

In Europe, it is an occasional weed, typically on roadways and railroad lines, occurring from France to Poland, southeast into Macedonia and Bulgaria, and thence around the areas north of the Black Sea. The report of *Iva xanthiifolia* in Armenia is the first report of the plant occurring in Eurasia south of the Caucasus Mountains. In Armenia, it occurs in mountainous desert steppe near the Arax River at an elevation of about 1450 meters. While the plant produces seed in great abundance, it is not known to have invaded cultivated areas of the region. It is not known to me to have spread to eastern Asia, nor to the southern hemisphere.

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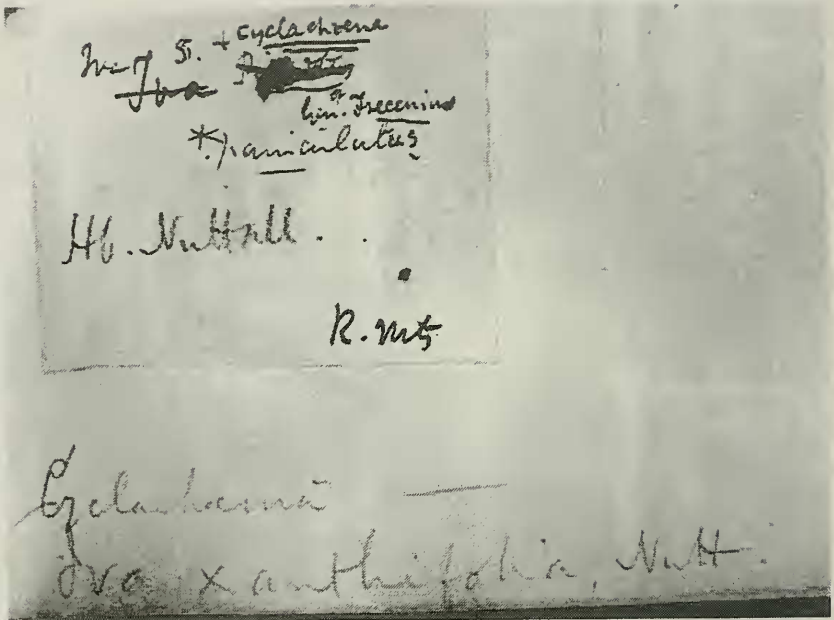


Fig. 1. Label of the holotype of *Iva paniculata* NUTT. (BM).